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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09 719,215	02 26 2001	Colin Forno	1028-0166P	7097

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EXAMINER

HO, ALLEN C

ART UNIT PAPER NUMBER

2882

DATE MAILED: 07/31 2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/719,215

Applicant(s)

FORNO ET AL.

Examiner

Allen C. Ho

Art Unit

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 26 February 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-3, 6 and 10-32 is/are rejected.
- 7) ☐ Claim(s) 4, 5, 7-9 and 33 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 26 February 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6 and 8
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:
 - (1) Page 14, line 36, "acquired images are" should be replaced by --the reference--.
 - (2) Page 14, line 37, "the reference" should be replaced by --acquired images--.
 - (3) Page 16, line 29, --2-- should be inserted after "camera".
 - (4) Page 16, line 33, --21-- should be inserted after "element".Appropriate correction is required.
2. This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required.

Drawings

3. The drawings are objected to because there is no discussion of Fig. 9 in the specification. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 3, 6, and 10-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lulli *et al.* (U. S. Patent No. 5,870,196) in view of Duffy (U. S. Patent No. 3,767,308).

Lulli *et al.* disclosed a measurement method comprising the steps of: arranging an interferometer (Fig. 1) to form a first interference fringe pattern comprising at least fifty interference fringes (speckle pattern); recording a digital image (M_x) of the first interference fringe pattern using a CCD camera (59); perturbing (47, 57) an optical path in the interferometer by translating a reflecting surface (43) to form a second interference fringe pattern comprising at least ten interference fringes; storing and processing the images using a central processing unit (14); and combining a digital image (M_{x+1}) of the second interference fringe pattern with the recorded image of the first interference fringe pattern to produce a further image comprising a fringe pattern arising from a difference or differences between the first and second interference fringe patterns ($M_d = |M_x - M_{x+1}|$), wherein the negative values are converted to positive values. Moreover, Lulli *et al.* disclosed a measurement method comprising the steps of: combining the recorded image with each one of a sequence of images of the interference fringe pattern at respective different times to produce a sequence of respective further images each comprising a fringe pattern arising from a difference between the recorded image and the respective one of the sequence of images (step 109). The sequence of images are captured and displayed (14a) at a certain rate as determined by the loop in the algorithm (Fig. 3).

However, Lulli *et al.* did not teach that the fringe pattern formed from a difference or differences between two interference fringe patterns is a moiré fringe pattern.

Duffy disclosed that a moiré fringe pattern is obtained by superimposing two successive interference fringe patterns, and that the moiré fringe pattern indicates the change (displacement) in the successive interference fringe patterns.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine two successive interference fringe patterns to form a moiré fringe pattern, since a person would be motivated to study the change in a sample as a function of depth.

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lulli *et al.* (U. S. Patent No. 5,870,196) and Duffy (U. S. Patent No. 3,767,308) as applied to claim 1 above, and further in view of Noguchi *et al.* (U. S. Patent No. 5,432,606).

Lulli *et al.* in combination with Duffy disclosed a measurement method as set forth in claim 1. However, these references do not teach a step of tilting a reflecting surface of the interferometer to increase the number of interference fringes in the first interference fringe pattern. Noguchi *et al.* taught tilting a reference mirror (5) to increase the number of interference fringes. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to adjust the tilt of a reflecting surface in an interferometer in order to increase the number of fringes, since a person would be motivated to increase the number of fringes in order to facilitate interferometric measurement.

Allowable Subject Matter

7. Claims 4, 5, 7, 8, 9, and 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter:

The allowable subject matter in claim 4 refers to a measurement method in accordance with claim 1, wherein the second interference fringe pattern comprises a larger number of interference fringes than the first interference fringe pattern.

The allowable subject matter in claim 5 refers to a measurement method in accordance with claim 1, wherein the step of perturbing includes the step of inserting a transparent object in the optical path.

The allowable subject matter in claim 7 refers to a measurement method in accordance with claim 1, wherein the step of perturbing includes at least one of the steps of distorting, rotating, and translating a transparent object in the optical path.

The allowable subject matter in claim 8 refers to a measurement method in accordance with claim 1, wherein the step perturbing includes the step of replacing a reference object with a test object.

The allowable subject matter in claim 9 refers to a measurement method in accordance with claim 1, wherein the step of perturbing includes at least one of the steps of disturbing a gas, and disturbing a gas flow in the optical path.

The allowable subject matter in claim 33 refers to a measurement method in accordance with claim 23, wherein the interferometer has an aperture of at least 10 cm.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- (1) Brandstetter *et al.* (U. S. Patent No. 5,732,163) describe angular alignment of structures using moiré patterns.
- (2) Dunn *et al.* (U. S. Patent No. 5,703,680) describe a method for dynamic interference pattern testing.
- (3) Pouet *et al.* (U. S. Patent No. 5,481,356) describe apparatus and method for nondestructive testing using additive-subtractive phase-modulated interferometry.
- (4) Hull-Allen (U. S. Patent No. 5,436,462) describes video contour measurement system employing moiré interferometry having a beat frequency pattern.
- (5) Pechersky (U. S. Patent No. 5,432,595) describes a method for measuring residual stresses in materials by plastically deforming the material and interference pattern comparison.
- (6) Noguchi (U. S. Patent No. 5,243,542) describes an interferometer employing reference images.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (703) 308-6189. The examiner can normally be reached at Monday - Friday from 8:00 am - 5:00 pm.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on (703) 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0530.

Allen C. Ho
Examiner
Art Unit 2882

ACH
July 29, 2002


ROBERT H. KIM
SUPERVISOR, ART UNIT 2882
JUL 30 2002